

In the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Please cancel Claims 1-8, 23-31 and 47-66.

Listing of Claims:

1. Canceled.

2. Canceled.

3. Canceled.

4. Canceled.

5. Canceled.

6. Canceled.

7. Canceled.

8. Canceled.

9. (Original) An audio-signal circuit, comprising:

audio input and output terminals;

a first series combination of two 2nd-order low-pass filters, the series combination having a first phase response, an input terminal coupled to the audio input terminal, and an output terminal;



a second series combination of two 2nd-order low-pass filters and two 2nd- order high-pass filters, the second series combination having a second phase response substantially equal to the first phase response, an input terminal coupled to the audio input terminal, and an output terminal;

a third series combination of two 2nd-order high-pass filters, the third series combination having a third phase response substantially equal to the first and second phase responses, an input terminal coupled to the audio input terminal, and an output terminal; and

a combining circuit having first, second, and third input terminals respectively coupled to the output terminals of the first, second, and third series combinations and having an output terminal coupled to the audio output terminal.

10. (Original) The audio-signal circuit of claim 9 wherein each filter of the first, second, and third series combinations has a Butterworth alignment.

11. (Original) The audio-signal circuit of claim 9 wherein the first series combination of the low-pass filters, the combination of the two low-pass filters and the combination of the two high-pass filters in the second series combination, and the third series combination of the high-pass filters each have a Linkwitz-Riley alignment.

12. (Original) The audio-signal circuit of claim 9 wherein:
the first series combination has a first cutoff frequency;
the second series combination has the first cutoff frequency and has a second cutoff frequency that is higher than the first cutoff frequency; and
the third series combination has the second cutoff frequency.

13. (Original) The audio-signal circuit of claim 9 wherein:
the first series combination has a cutoff frequency within a first range of approximately 250 - 400 Hz;

the second series combination has a first cutoff frequency within the first range and has a second cutoff frequency within a second range of approximately 3 - 5 kHz; and the third series combination has a cutoff frequency within the second range.

14. (Original) The audio-signal circuit of claim 9 wherein:
the first series combination has a cutoff frequency of approximately 300 Hz; the second series combination has a first cutoff frequency of approximately 300 Hz and has a second cutoff frequency of approximately 4 kHz; and
the third series combination has a cutoff frequency of approximately 4 kHz.

15. (Original) The audio-signal circuit of claim 9 wherein:
the first series combination has a first cutoff frequency and a first gain that is - 6dB at the first cutoff frequency;
the second series combination has the first cutoff frequency, a second cutoff frequency that is higher than the first cutoff frequency, and a second gain that is - 6dB at the first and second cutoff frequencies; and
the third series combination has the second cutoff frequency and a third gain that is -6dB at the second cutoff frequency.

16. (Original) The audio-signal circuit of claim 9 wherein:
the first series combination has a gain of approximately -40dB at 100 Hz; and the third series combination has a gain of approximately -40dB at 12 kHz.

17. (Original) The audio-signal circuit of claim 9 wherein:
the first series combination includes a gain control coupled in series with its two low-pass filters; and
the third series combination includes a gain control coupled in series with its two high-pass filters.

18. (Original) The audio-signal circuit of claim 9 wherein the second series combination includes a gain control coupled in series with its two low-pass and two high-pass filters.

19. (Original) The audio-signal circuit of claim 9 wherein each filter of the first, second, and third series combinations has a Sallen and Key topology.

20. (Original) The audio-signal circuit of claim 9 wherein:
the first, second, and third series combinations have respective first, second, and third gains; and
the first, second, and third phase responses of the first, second, and third series combinations are respectively independent of the first, second, and third gains.

21. (Original) The audio-signal circuit of claim 9 wherein the combining circuit comprises a summer.

22. (Original) The audio-signal circuit of claim 9 wherein the two 2nd-order low-pass filters of the first series combination, the two 2nd-order low-pass filters and the two 2nd-order high-pass filters of the second series combination, and the two 2nd-order high-pass filters of the third series combination comprise respective digital filters.

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32. (Original) An audio-signal circuit, comprising: audio input and output terminals;

a 2nd-order low-pass filter that has a first phase response, an input terminal coupled to the audio input terminal, and an output terminal;

a series combination of a 2nd-order low-pass filter and a 2nd-order high-pass filter, the series combination having a second phase response substantially equal to the first phase response, an input terminal coupled to the audio input terminal, and an output terminal; and

a 2nd-order high-pass filter that has a third phase response substantially equal to the first and second phase responses, an input terminal coupled to the audio input terminal, and an output terminal; and

a combining circuit having first, second, and third input terminals respectively coupled to the output terminals of the low-pass filter, series combination of low-pass and high-pass filters, and high-pass filter and having an output terminal coupled to the audio output terminal.

33. (Original) The audio-signal circuit of claim 32 wherein:

the low-pass filter, the low-pass and high-pass filters of the series combination, and the high-pass filter each have a Linkwitz-Riley alignment.

34. (Original) The audio-signal circuit of claim 32 wherein:
the low-pass filter, the low-pass and high-pass filters of the series combination, and
the high-pass filter each have a Linkwitz-Riley alignment; and
one of the low-pass and high-pass filters of the series combination has an inverting
topology.

35. (Original) The audio-signal circuit of claim 32 wherein:
the low-pass filter, the low-pass and high-pass filters of the series combination, and
the high-pass filter each have a Linkwitz-Riley alignment; and
one of the low-pass and high-pass filters of the series combination has an inverting
multiple-feedback topology.

36. (Original) The audio-signal circuit of claim 32 wherein: the low-pass filter
has a first cutoff frequency;
the series combination of the low-pass and high-pass filters has the first cutoff
frequency and has a second cutoff frequency that is higher than the first cutoff frequency; and
the high-pass filter has the second cutoff frequency.

37. (Original) The audio-signal circuit of claim 32 wherein:
the low-pass filter has a cutoff frequency within a first range of approximately
250 - 400 Hz;
the series combination of the low-pass and high-pass filters has a first cutoff
frequency within the first range and has a second cutoff frequency within a second range of
approximately 3 - 5 kHz; and
the high-pass filter has a cutoff frequency within the second range.

38. (Original) The audio-signal circuit of claim 32 wherein:
the low-pass filter circuit has a cutoff frequency of approximately 300 Hz;

the series combination of the low-pass and high-pass filters has a first cutoff frequency of approximately 300 Hz and has a second cutoff frequency of approximately 4 kHz; and

the high-pass filter has a cutoff frequency of approximately 4 kHz.

39. (Original) The audio-signal circuit of claim 32 wherein:

the low-pass filter has a first cutoff frequency and a first gain that is -6dB at the first cutoff frequency;

the series combination of the low-pass and high-pass filters has the first cutoff frequency, a second cutoff frequency that is higher than the first cutoff frequency, and a second gain that is -6dB at the first and second cutoff frequencies; and

the high-pass filter circuit has the second cutoff frequency and a third gain that is -6dB at the second cutoff frequency.

40. (Original) The audio-signal circuit of claim 32 wherein:

the low-pass filter has a gain of approximately -20dB at 100 Hz; and the high-pass filter has a gain of approximately -20dB at 12 kHz.

41. (Original) The audio-signal circuit of claim 32, further comprising:

a low-pass gain control coupled in series with the low-pass filter; and a high-pass gain control coupled in series with the high-pass filter.

42. (Original) The audio-signal circuit of claim 32, further comprising a gain control coupled in series with the low-pass and high-pass filters of the series combination.

43. (Original) The audio-signal circuit of claim 32 wherein each of the low-pass and high-pass filters and one of the filters of the series combination has a Sallen and Key topology.

44. (Original) The audio-signal circuit of claim 32 wherein:
the low-pass, high-pass, and series combination of low-pass and high-pass
filters have respective first, second, and third gains; and
the first, second, and third phase responses are respectively independent of the first,
second, and third gains.

45. (Original) The audio-signal circuit of claim 32 wherein the combining circuit
comprises a summing circuit.

46. (Original) The audio-signal circuit of claim 32 wherein the low-pass filter, the
lowpass and high-pass filters of the series combination, and the high-pass filter comprise
respective digital filters.

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